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Abstract

In the context of Decentralization in Indonesia, not much of assessment is given to the provincial level. Despite limited functions of provincial government, provincial governments have relatively more tax autonomy, thus making it possible to conduct and coordinate program priorities in the region through its government spending. However, democratic process starting in 2004 is believed could make government put less priority on longer-term objective such environmental protection, in this case referring to protection of forest. Based on provincial panel data from period of 2001-2010, we found higher spending on agriculture and forestry of lower level government may associate with a decrease in forest area after year 2004, especially on province level of government.

Keyword: forestry, province and local government spending, intergovernmental transfers, decentralization

JEL Codes: H7, Q2

¹ This version has been presented in NARSC 2013 Conference, Atlanta - US, November 15 2013.

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Introduction

Forest management and externality embedded in it is a challenge on which level of government would actually be effective to meet the needs on managing the forest. Characteristics and structure of government revenues and spending pattern may play role on level of government put concern on forest management especially on the one associated with minimizing deforestation or improvement of forest cover.

Existing studies on forest management have not yet lead to the same conclusion on the effect of institution on forest conservation. Barbier (2004) uses perceived level of law and corruption and found that corruption tends to increase land use expansion, though there is no impact on the extent of political stability on agricultural land expansion. Meanwhile, based on data of forestry of Indonesia, Burgess et al. (2011) also found inconclusive finding on the impact of political indicators on forest management.

Studies exploring effect of politic on deforestation in Indonesia mostly relies on local level (Burgess et al. 2011) assuming less function conducted at provincial level. However, on forest management, there are shifting from high local discretion to a more centralized system. The forestry sector Law (Law 41 1999) emphasizes on the management of forestry at central level, which also includes on government revenues from forestry (i.e. licensing and royalties).

Studies on forest protection mostly focus on factors affecting deforestation, and there are abundance of literature on exploring deforestation.² In regard to study of forest protection in Indonesia, a focus mostly on local level and there is not yet a study that explored both policies of lower level governments related to forestry sector, a provincial as well as local government. In this case, lower level governments performance associated with forest management can be measured by the impact of its policy either on spending side or revenue side on forest protection referring to indicator of forest cover area. The context of three-tier level of government may imply that even among lower level of governments, they may instead have a conflicting interest due to the built-in different incentive based on functional arrangement as regulated in the sector.³

Administrative Decentralization introduced in 2001 has been characterized by functional arrangement that mostly fall as the responsibilities of local governments. In the case of forest management in Indonesia, there is a belief that decentralization has put management of forestry in chaos (Bar et al. 2006). A shift of system in 2001 is continued as in 2004 there is also adoption of political decentralization in which head of provinces and local governments are determined from democratic election.

² See Sunderlin and Resosudarmo (1996) on review of literature on Indonesia deforestation.

³ PP 38 2007 and Forestry Law 41 1999 stated that each level of government can manage forest area based on scale and status of the forest.

Forest management and Provincial Expenditures and Revenues

Forests are a representation of common-pool resources between communities, and government between central and its lower level governments. Other than competition among agencies, a choice of exploiting forestry resource may be in competition with other type of natural resources such as mining or to some extent on plantation or agricultural sector.

Forest sector is relatively highly regulated, and it is considered as more influenced by government decision at local level especially in the context of Indonesian decentralization (Burgess et al. 2011). There are various revenues from forestry exploitation that are managed by government either at central level through land rent, royalties, deforestation charges, or through licensing at local level. In addition to extracting revenues, forest sector is also dependent on government expenditure programs given authority in managing forests area is mostly conducted by central government.

Existing recent studies on deforestation focused more on institution, implying that government policies may play a dominant role on forest management and thus affecting the output of forest conservation. Government preferences might be reflected through their planning priorities. Though one cannot know priorities and qualities of the planning, we might explore provinces planning priorities through their pattern of expenditures. Province revenues structure may also play role on attaining their planning priorities.

The extent of forest management associate on which level below central government that influence output of forest management in terms of forest cover area. Government activities on forest management could be associated with the degree of priorities that government put to maintain resources or not to change it to make present tangible product from forest exploitation. In this case, forest exploitation could range from activities that are not affecting much of a change in forest ecosystem by not cutting trees or hunting animals in the forest area.

Previous studies found that deforestation indirectly associate with government policies on pattern of their spending, in this case of whether provincial or local governments put priorities on capital spending.⁴ Putting priorities on forest management to some extent can be considered as investment. The benefit of the program would take time and might be perceived to accrue in the long-term, whereas costs on forest management would also associate with an alternative use of natural resources referring to a relatively high opportunity costs in maintaining the forests. There are two outcomes that might occurred on the extent to determine what might characterize provinces or local governments that would choose to maintain or conserve forests, thus limiting deforestation and engaging in afforestation effort.

⁴ As cited from Ministry of Finance report (2012), provincial and local governments in Indonesia have not yet focused on expenditures program that can be viewed as long-term investment that could be said as cost-saving by engaging in infrastructure programs.

For lower level governments, province or local government that have relatively high share of its expenditures on capital expenditures, may be viewed to have preference on public investment. It is likely that this type of government would choose to conserve forest when it needs to deal with the choices of whether to extract forest or a choice to convert forest in to other use mostly is for agricultural use. Meanwhile, based on type of revenues received by local governments, additional revenues that come from revenue sharing would lower pressure on forest exploitation, especially on regions that received revenue sharing on non-related forest areas such as the case of revenue sharing from taxes or oil and gas revenue sharing (Wunder and Sunderlin 2004).

Forest Protection: Estimation Model

Given the characteristic of data and considering that this study will use forest cover data based on MODIS Satellite image as well as Landsat image as stated in Forestry Statistic, thus there is three model of estimation: 1) MODIS Forest cover area from 2001-2008, 2) Landsat Forest cover area from 2003-2010.

In addition to data availability of a different data source of forest cover areas, separating regressions in to two period of estimations, to some extent would exclude the different context of institution especially in regard to policy of decentralization as there is an amended Law of No 22 and 25 1999) that has been changed into Law 32 and 33 2004 to accommodate a different approach of the functional arrangement among level of government, from previously residual approach to closed-list approach, and as stated previously, there is also a change of provincial and local government political system that moved to direct election of head of region from previously are appointed by legislatures. Therefore, we apply panel specification as follows:

$$y_{it} = \alpha_0 + D_T + \Sigma\beta E_{it} + \Sigma\delta X_{it} + v_i + e_{it} \quad (1)$$

$$y_{it} = \alpha_0 + D_T + \Sigma\beta E_{it} + \Sigma\beta D_T E_{it} + \Sigma\delta X_{it} + v_i + e_{it} \quad (2)$$

where:

E_{it} = Realized province government (or local government consolidated) spending

D_T = Time dummy variable (D=1 for year 2004 and forward)

X_{it} = Other explanatory variables

v_i = time invariant error

e_{it} = time variant error

The estimation assumes that there is a structural change that may influence preference of province and local government on forest protection. In this case, the channels on how a system of direct election is through government spending. Thus, other than dummy variable on period of direct election system, there is also a slope dummy on government expenditure variable as shown in estimation (2). In this case, estimation (1) is the baseline

estimation, in which only year period dummy, thus assuming there is no structural change on related government spending.

Other explanatory variables consist of socio-economic indicators consisted of Gross Regional Domestic Product (GRDP), population, and share in agricultural sector. Sunderlin and Resosudarmo (1996) review studies on deforestation in Indonesia and concluded that there are relatively complex issues underlying what causes deforestation in Indonesia. A review of literatures by Sunderlin and Resosudarmo (1996) classifies determinants of deforestation in Indonesia, which in this case closely related to forest area, of land-use change from transmigration or plantation small-holders, agricultural crop industry, political institution, and economic development variables. They stated that other than the factor of land changes or agricultural expansion, institutions such as government policies and economic development may play role and needs to be more explored.

Meanwhile, recent studies that are conducted after decentralization period generally focused more on political institution rather than land-use change or agricultural crop industry (Burgess et al. 2011, Galinato and Galinato 2013, Fredrikkson 2013). Political stability at national level tend to have positive effect on forest protection (Galinato and Galinato 2013). Burgess et al. (2011) found that new formation of local governments in Indonesia tend to have higher deforestation. As observations in this study is provincial level, we identify new local governments as the number formation of new local governments within province on a particular year.

Data

We use data of forest cover from MODIS satellite image that come from study of Burgess et al. (2011). In comparison, as one unresolved issue is on the data that are considered as forest area, we also use forest cover data come from Landsat Satellite image from Forestry Statistic that is issued by Ministry of Forestry. Based on Forestry Statistic, we use forest area coverage that consisted of primary and secondary dry land forest, primary and secondary swamp forest, primary and secondary mangrove forest, and plantation forest. However, the annual forest cover data of Landsat image is not available every year prior to 2004. Forest cover data stated in Forestry Statistic use Landsat Satellite image for the year 2001, 2003, and annually after 2004. Therefore, on estimation that based on MODIS forest cover data we use period of 2001-2008 while the period of estimation is between 2003-2010 on Landsat forest cover area. Given this different dataset, we also treat province as province that has forest area if that province is included in both MODIS and Landsat data. Thus, total observations are 136 out of previously 330 observations.

Data of government expenditures on forestry for the provincial and local government level are extracted from Ministry of Finance, Directorate of Fiscal Balance (DJPK – *Direktorat Jenderal Perimbangan Keuangan*) website. Given classification of publicly available government expenditures based on sector, data of government expenditure on sector forestry are still aggregated with expenditures on agriculture and plantation. In terms of

local government expenditures, data are consolidated local government expenditures on forestry and agriculture within a province. Therefore, we also use variable the size of agricultural sector by using share of agriculture sector in GRDP as other explanatory variable.

We use share of own source revenues to total realized budget as measure of province tax share. On average, province level of government has relatively more discretion and granted a relative buoyant type of taxes in comparison to local level of government. In this case, we also include revenue sharing received by local governments from central government, but we do not include local own revenues given a relatively insignificant amount of local own revenues in context of Indonesian local government budget structures. In this case, Tabel 1 shows statistics summary of the data.⁵

Results

Table 2 shows on how the estimation results on the effect of government spending is quite different between estimation specification (1) and (2).⁶ In estimation (1), the effect of both province government as well as local government forest and agriculture spending on forest cover area ranged from negative effect on definition and measurement of forest area based on MODIS data, and non-significant effect of both province and local government forest and agriculture spending on forest cover areas based on Landsat data. Meanwhile, the estimation results based on specification (2), indicate that forest and agriculture spending on provincial level seem to be ineffective. Prior to year 2004, the effect of province forestry and agriculture spending on forest cover areas is still positive, which means that higher spending in this sector associate with expansion in forest cover areas. However, after 2004, in both estimation that based on MODIS or Landsat forest cover areas, it shows that higher spending instead leads to lower forest cover areas. Higher government expenditures on forestry sector at province level that tends to reduce forest cover area in that province, may imply that the focus of that sector may be more on administrative and have not yet emphasized on enforcement of forest protection.

The consistent pattern on the effect of provincial government forest and agriculture spending does not apply in regard to the effect of consolidated local government forestry and agricultural spending on forest cover areas. Between estimation based on MODIS and Landsat data, the results from specification (2) show a different effect of local government forest and agriculture spending on forest areas. Based on MODIS data, the effect of local government forest and agriculture spending is negative on forest cover areas, while the effect is not significant under the estimation that use Landsat data of forest cover areas.

Identifying whether an increase on capital spending by either province or local government also associate with forest protection given that activities to preserve forest also reflect government preference to investment type of spending, estimation (3) in Table 2 shows no

⁵ See Annex

⁶ See Annex

evidence that higher capital spending of the province or local government is in line with forest management referring to an increase in forest area. This finding may imply that high capital spending might instead tends to be low in governance and thus reduce the effectiveness of the spending size (Kuncoro et al. 2013).

Other than expenditures, government policy on revenues to some extent may influence decision of government to over-exploit or at least does not engage in forest protection effort. Some studies on case of Indonesia forest, has found that the over-exploitation of forest for lower level government revenues may likely resulted from unclear regulatory framework on sub-national and local taxes and charges (Smith et al. 2003). From Table 2, overall, it is shown that the revenue sharing received by provincial government tend to have positive effect on forest cover area. Provinces with higher revenue sharing also have larger forest cover areas. In this case, provincial government may put concern on sustaining forest sector resource when the stake is quite high in terms of the loss in revenue sharing if the forest resources are depleted quite fast. Meanwhile, on the case of local governments revenue sharing, higher revenue sharing seems to associate with depletion of forest cover area.

In terms of size of economic activity, region economic development represented by Gross Regional Domestic Product (GRDP) seem to have forest cover area that is based on MODIS data. As shown in estimation results in Table 2, there is evidence of the existence of Kuznets condition on the relationship of economic development and forest natural resource protection (Choumert et al. 2013). Higher GRDP in province with high GRDP to start with would associate with an increase effort in forest protection. Meanwhile, for the provinces with relatively low GRDP, it is possible that an increase in GRDP might instead put pressures on forest protection.

Conclusion

Our results show that the efficacy of provincial and local governments forest management through its expenditures are still in question. Especially in the case of the province, there is a consistent negative effect from provincial forest expenditures on forest protection, after the year 2004, in contrast to the year prior 2004 that shows relatively an increase in provincial government expenditures would associate with higher forest protection. This finding raises question on whether putting coordination at the provincial level on region forest management might work.

However, on revenues side, there is a positive effect of both revenue sharing and own revenues of provincial government. And this result is in reverse for the case of the local governments. The contrasting result between the effect of government spending of the provincial level and its revenues might suggest of the alternative function of provincial government on forest management.

Forest management needs to be cooperated not only in context of program or spending related activities, but also on revenues policies. Finding what best conducted by each level

of government in terms of forest management would be a start in tailoring coordinated and consistent planning of forest protection across level of government.

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ANNEX Table 1 Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	Max
MODIS Forest cover areas (Ha)	136	1,451,722.00	1,624,675.00	201,239.00	7,038,848.00	7,038,848.00
Landsat Forest cover areas (Ha)	136	4,921,477.00	7,903,371.00	207,277.50	40,800,000.00	40,800,000.00
Local government forestry and agriculture expenditures (Million IDR)	136	499,591.80	1,182,136.00	-	6,614,012.00	6,614,012.00
Province expenditures on forestry and agriculture (Million IDR)	136	44,943.20	76,245.10	-	723,264.00	723,264.00
Local government per capita capital spending (IDR)	136	996,381.60	1,367,513.00	-	7,751,501.00	7,751,501.00
Province per capita capital spending (IDR)	136	281,405.40	436,092.30	-	2,609,727.00	2,609,727.00
Population (people)	132	4,350,131.00	2,952,768.00	1,500,000.00	16,000,000.00	16,000,000.00
GRDP (Billion IDR)	136	34,008.13	28,075.48	5,070.10	106,172.00	106,172.00
Per capita province own revenues (Thousand IDR)	132	105.54	88.80	-	654.16	654.16
Local government per capita revenue sharing (IDR)	132	401,745.80	721,623.80	11,064.56	4,766,667.00	4,766,667.00
Province per capita revenue sharing (IDR)	132	80,238.98	169,634.10	-	1,133,333.00	1,133,333.00
% share of forest and agricultural spending	135	28.05	14.73	4.70	41.40	41.40
Number of new local governments formed	136	0.78	1.64	-	9.00	9.00

ANNEX Table 2. Forest cover area (Ha) Estimation Results: Fixed Effect

Variables	(1) MODIS	(1) LANDSAT	(2) MODIS	(2) LANDSAT	(3) MODIS	(3) LANDSAT
Local Forest and Agriculture Expenditures	-0.005** (0.00)	0.07 (0.06)	0.27* (0.14)	-7.94 (5.18)		
Local Forest and Agriculture Expenditures x Dummy 2004-End Period			-0.27** (0.14)	8.02 (5.18)		
Province Forest and Agriculture Expenditures	-0.23*** (0.08)	-1.38 (2.43)	0.48* (0.29)	28.95** (12.36)		
Province Forest and Agriculture Expenditures x Dummy 2004-End Period			-0.72*** (0.28)	-30.78** (12.33)		
Dummy 2004 – End Period	-9393.35*** (7082.83)	-985042.40*** (234497.20)	15205.4* (8273.3)	-838325.8*** (334336.5)	-657.22 (6451.29)	-701789.60*** (225277.40)
Province Capital Expenditures					-0.07** (0.01)	-1.48*** (0.39)
Local Capital Expenditures					-0.002 (0.00)	0.10 (0.10)
Population	-0.0003 (0.00)	-0.0005 (0.05)	0.0004 (0.00)	-0.005 (0.05)	0.0003 (0.00)	0.01 (0.05)
GRDP	-3.04* (1.85)	13.99 (59.37)	-4.74*** (1.70)	-17.39 (59.12)	-3.99** (1.9)	-16.34 (63.1)
GRDP Square	0.0000 (0.00)	0.0002 (0.00)	0.00003*** (0.00)	0.0005 (0.00)	0.00003** (0.00)	0.0006 (0.00)
Per Capita Provincial Own Revenues	-84.18 (75.73)	5455.68** (2252.90)	-48.67 (68.28)	5260.55** (2191.39)	30.54*** (68.56)	7022.06 (2137.51)
Per Capita (Local) Revenue Sharing	-0.02* (0.01)	-0.72** (0.28)	-0.02* (0.01)	-0.84** (0.33)	-0.011 (0.01)	-0.271 (0.27)

Variables	(1) MODIS	(1) LANDSAT	(2) MODIS	(2) LANDSAT	(3) MODIS	(3) LANDSAT
	(0.01)	(0.36)	(0.01)	(0.36)	(0.01)	(0.34)
Per Capita (Province) Revenue Sharing	0.01	1.24	0.02	1.34	-0.01	-0.18
	(0.03)	(0.95)	(0.03)	(0.92)	(0.03)	(0.82)
Share of GRDP Agriculture	-1849.31	47159.64	366.23	17571.81	-455.20	62678.52
	(1515.37)	(51511.29)	(1452.79)	(54395.51)	(1373.60)	(48434.93)
Number of New Local Governments Formation	2234.20	-423061.20***	2120.35***	-441268.20***	4066.61***	-360285.30***
	(1630.56)	(58153.85)	(1459.95)	(57741.56)	(1514.30)	(55831.56)
Constant	1581284.00	3333859.00	1530314.00	4638708.00	1545213.00	2943951.00
	(72104.71)	(2362406.00)	(65668.59)	(2466842.00)	(70129.56)	(2421274.00)
Observations	115	100	115	100	115	100

Notes: * significant in 10%, ** significant in 5%, *** significant in 1%; Period of Estimation Modis Forest Cover 2001-2008; Period of Estimation Landsat Forest Cover Area 2003-2010

